Electronic Version
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Claims

[c1] An anode assembly comprising:
a thermally conductive bearing encasement covering at least a portion of at least one bearing; and
an anode rotating on said at least one bearing and having a target with an associated focal spot;
said thermally conductive bearing encasement configured and expansion limited to prevent displacement of said focal spot of greater than a predetermined displacement.

[c2] An assembly as in claim 1 wherein said thermally conductive bearing encasement comprises a thermally conductive stem.

[c3] An assembly as in claim 2 wherein said thermally conductive stem is formed of at least one material selected from an alloy, 36 alloy, 39 alloy, 42 alloy, 45 alloy, 49 alloy, Invar 36® Alloy, Kovar® Alloy, Ceramvar® Alloy, and Inco 909.

[c4] An assembly as in claim 2 wherein said thermally conductive stem is formed of a combination of a plurality of materials selected from iron, nickel, and cobalt.

[c5] An assembly as in claim 1 wherein said thermally conductive bearing encasement comprises a thermally conductive housing.

[c6] An assembly as in claim 5 wherein said thermally conductive housing is formed of at least one material selected from an alloy, 36 alloy, 39 alloy, 42 alloy, 45 alloy, 49 alloy, Invar 36® Alloy, Kovar® Alloy, Ceramvar® Alloy, and Inco 909.

[c7] An assembly as in claim 5 wherein said thermally conductive housing is formed of a combination of a plurality of materials selected from iron, nickel, and cobalt.

[c8] An assembly as in claim 1 further comprising a heat shield preventing thermal energy transfer between said anode and said bearings.

[c9] An assembly as in claim 8 wherein radial height of said heat shield is less than a predetermined height for thermal energy passage between said anode and said at least one bearing of greater than a predetermined threshold.

[c10] An assembly as in claim 8 wherein radial height of said heat shield is less than a predetermined height for temperature continuity between bearings of said at least one bearing.

[c11] An assembly as in claim 8 wherein said heat shield comprises at least one hole for the transfer of thermal energy.

[c12] An assembly as in claim 11 wherein said at least one hole are oriented to allow thermal energy transfer between said anode and said at least one bearing.

[c13] An assembly as in claim 8 wherein said thermally conductive bearing encasement and said heat shield maintain operating temperatures of said at least one bearing to be within a predetermined operating range.

[c14] An assembly as in claim 13 wherein said predetermined operating range is approximately 400°C to 550°C.

[c15] An assembly as in claim 1 wherein said thermally conductive bearing encasement prevents displacement of said focal spot in a forward direction along a longitudinal center axis of rotation of said anode.

[c16] An x-ray source comprising:
a cathode emitting electrons;
a thermally conductive bearing encasement comprising at least one alloy material and covering at least a portion of at least one bearing;
an anode rotating on said at least one bearing and hav-

ing a target whereupon said electrons impinge to generate x-rays with an associated focal spot; and
a thermal shield residing between said thermally conductive bearing encasement and said anode;
said thermally conductive bearing encasement and said thermal shield configured and expansion limited to prevent displacement of said focal spot.

[c17] An x-ray source as in claim 16 wherein radial height of said heat shield is less than a predetermined height for temperature continuity between bearings of said at least one bearing.

[c18] An x-ray source as in claim 16 wherein said heat shield comprises at least one hole for the transfer of thermal energy.

[c19] An imaging system comprising:
an x-ray source comprising;
a cathode emitting electrons;
a thermally conductive bearing encasement comprising at least one alloy material and covering at least a portion of at least one bearing;
an anode rotating on said at least one bearing and having a target whereupon said electrons impinge to generate x-rays with an associated focal spot; and
a thermal shield residing between said thermally con-

ductive bearing encasement and said anode;
said thermally conductive bearing encasement and said thermal shield configured and expansion limited to prevent displacement of said focal spot of greater than approximately 700μm.

[c20] An imaging system as in claim 19 wherein said heat shield comprises at least one hole for the transfer of thermal energy and radial height of said heat shield is less than a predetermined height for temperature continuity between bearings of said at least one bearing.

[c21] A method of forming a thermally conductive bearing encasement for an anode assembly comprising:
determining a maximum focal spot displacement associated with target of the anode assembly;
determining a desired elastic modulus of at least one control alloy expansion material for the thermally conductive bearing encasement in response to said maximum focal spot displacement;
determining a desired thermal conductivity of said at least one control alloy expansion material;
determining said at least one control alloy expansion material in response to said elastic modulus and said thermal conductivity; and
forming the thermally conductive bearing encasement at least partially from said at least one control alloy expan-

sion material.

[c22] A method as in claim 21 further comprising:
determining a desired level of rust for the thermally conductive bearing encasement; and
determining said at least one control alloy expansion material in response to said level of rust.

[c23] A method as in claim 21 further comprising:
determining an anode bearing temperature operating range; and
determining said at least one control alloy expansion material in response to said anode bearing temperature operating range.